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Lightning Conductors and Lightning Guards

As a result of being asked to give public lectures on the subject, the eminent physicist Oliver Lodge (1851–1940) published in 1892 a pioneering study of the protection of buildings, cables and telegraphic instruments from the devastation caused by lightning strikes. This work led him almost immediately to the discovery of electromagnetic wave transmission and ultimately to the development of a version of radio telegraphy. Lodge also saw that many of the current theories about the nature of lightning were seriously in error, and his investigations led to a number of significant changes in the design of lightning conductors and lightning guards. Some of the methods and procedures that Lodge advocated have since become standard practice. They are described with Lodge's characteristic flair and accompanied by a wealth of illustrations that give a fascinating insight into how contemporary scientists and engineers tackled this significant problem.

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Lightning Conductors and Lightning Guards

OLIVER LODGE



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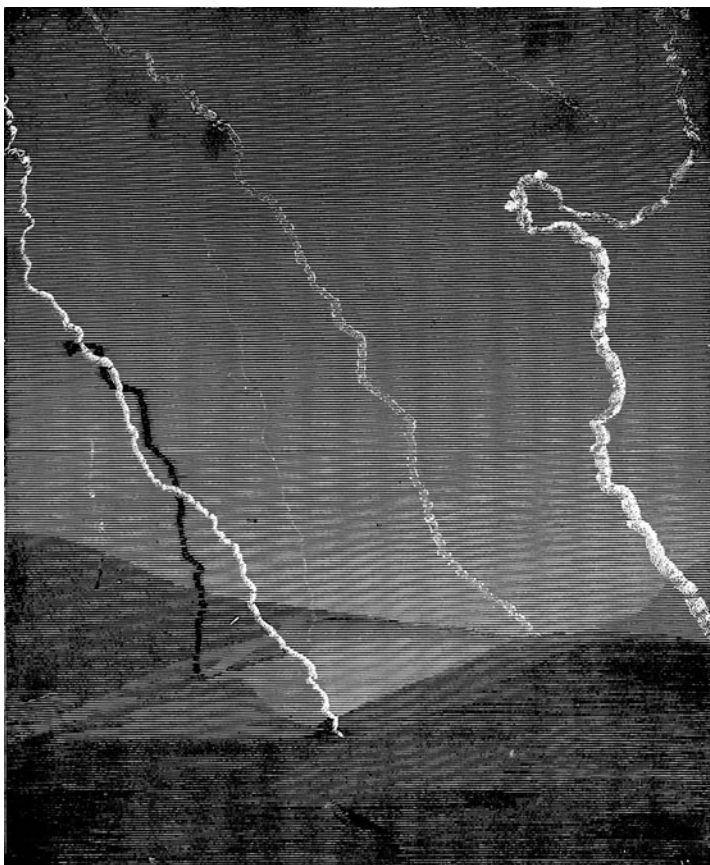
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LIGHTNING PHOTOGRAPH BY MR. A. W. CLAYDEN, SHOWING
THE CURIOUS PHOTOGRAPHIC APPEARANCE KNOWN AS
THE "DARK FLASH."

Frontispice.

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LIGHTNING CONDUCTORS AND LIGHTNING GUARDS.

A TREATISE ON THE PROTECTION OF BUILDINGS, OF
TELEGRAPH INSTRUMENTS AND SUBMARINE
CABLES, AND OF ELECTRIC INSTALLATIONS
GENERALLY, FROM DAMAGE BY
ATMOSPHERIC DISCHARGES.

BY

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PROFESSOR OF PHYSICS IN UNIVERSITY COLLEGE, LIVERPOOL.



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CHANCERY LANE.

PREFACE.

THIS book is the outcome of a couple of lectures which in 1888 I was asked by Sir Trueman Wood, Secretary to the Society of Arts, to deliver in memory of the late Dr. Robert Mann, an enthusiastic advocate of lightning rods in South Africa and elsewhere, and they are published with the sanction and approval of the Society.

Experiments made by me shortly before the lectures showed me that several of the current ideas on the subject were unfounded and incorrect; mainly because the momentum of an electric current and the energy of an electrostatic charge had both been more or less overlooked by those who had treated the subject. The application of the known fact of electrokinetic momentum revolutionized the treatment of certain phenomena. The old drainpipe idea of conveying electricity gently from cloud to earth was thus proved fallacious, and the problem of protection became at the same time more complex and more interesting.

An idea at one time got abroad that my experiments proved existing lightning conductors to be useless or dangerous; this is an entire misrepresentation. Almost any conductor is probably better than none, but few or no conductors are absolute and complete safeguards. Certain habits of lightning rod practice may be improved, and the curious freaks or vagaries of lightning strokes in protected buildings are intelligible without

any blame attaching to the conductor ; but this is very different from the contention that lightning rods are unnecessary and useless. They are essential to anything like security. A summary of the changed views will be found in chapter xxvi., p. 366. A still fuller summary was written a year or two ago for the American monthly "The Forum," but, so far as I know, this latter article has not yet appeared, or I would have appended it to this book.

The lightning photographs, which have lost terribly in reproduction and diminution of size, are mostly the property of the Royal Meteorological Society. I acknowledge indebtedness to many writers on the subject ; but principally perhaps to the author and reviser of the third edition of "Lightning Conductors," by Richard Anderson, 1885, and to the "Report of the Lightning Rod Conference," 1882, both published by Spon. Remarkably extensive references to the literature of the subject are contained in these works.

To workers who had been led by experience along something of the same lines as experiment and theory have led me, I attempt to do justice in an appendix.

The protection of cables and telegraphic instruments in general from lightning constitutes another branch of the subject, and one that can be treated far more definitely and distinctly than can the protection of buildings. This branch of the subject is discussed at length in Part II. ; and instruments made by Dr. Alexander Muirhead are there depicted which are now on trial in several important cable stations.

Many points of considerable theoretical interest arose in the course of the investigation, and these are several times briefly referred to ; in fact, the whole matter became far more extensive and interesting than could at

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first sight have been expected. It rests now with architects, engineers, and practical men generally to determine the modifications which they may think desirable to introduce into existing practice.

O. J. L.

UNIVERSITY COLLEGE: LIVERPOOL.
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